Adolescent involvement in anti-social and delinquent behaviours: Predicting future injury risk

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Abstract

The purpose of this study was to challenge the broadly based focus of injury prevention strategies towards concern with the needs of young adolescents who engage in multiple anti-social and delinquent behaviours. Five hundred and forty 13-14 year olds reported on injuries and truancy, violence, illegal road behaviours, drug, and alcohol use. Engagement in these behaviours was found to contribute to the likelihood of an injury. Those engaging in the most anti-social and delinquent behaviours were around five times more likely to report medically-treated injuries in the past three months. Their likelihood of future injury was 1.8 times more likely when they were followed up three months later. The engagement in multiple delinquent and illegal behaviours thus significantly increased the likelihood of injury and identifies a particularly vulnerable group. The findings also suggest that reaching these young people represents a key target for change strategies in injury prevention programs.

Key words: adolescent, injury, anti-social, delinquent behaviour

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1. Introduction

Injury is a considerable public health problem in that it represents the leading cause of death among adolescents (Centers for Disease Control, CDC, 2010). For every adolescent injury death however there are many more who are hospitalised and many more again who experience other negative consequences as a result. One study in the United States reported that for every unintentional injury death among adolescents aged 10-19 years, there are approximately 12 hospitalisations and 641 Emergency Department (ED) presentations (Sleet, Ballesteros & Borse, 2010). Because of the pervasive and substantial scope of the injury problem, there has been much demand for research that identifies the factors that elevate adolescents' risk of injury and thus enables prevention strategies to efficiently address relevant factors (e.g. Finney et al., 1993).

The identification of individual and clusters of behaviours that place an adolescent at risk of injuries thus has considerable potential to inform public health and other injury prevention programs. Participation in delinquent and anti-social behaviours increases throughout adolescence. Findings from the Youth Risk Behavior Survey (CDC, 2010) conducted in the U.S. showed that 32% of 14 year olds had drunk alcohol in the month prior to completing the survey and 26% had used marijuana. The study also showed that 37% had engaged in a physical fight in the past 12 months. In the Australia state of Victoria, Toumbourou and colleagues (2009) found that among 14 year olds, 10% reported having engaged in a fight in the past 12 months, and 54% had drunk alcohol and 9% had taken illicit drugs in the past month.

While some research has looked at the direct link between participation in such behaviours and adolescent injury (e.g. Pickett et al., 2005), theoretical frameworks suggest the importance of underlying factors in determining outcomes. Problem Behavior Theory

(PBT), as proposed by Jessor and Jessor (1997), states that a large number of behaviours in adolescence, such as alcohol, substance use and risky driving, are interrelated. According to this theory, problem behaviours during this period are outward expressions of an underlying propensity for such behaviour, which is related to both the adolescent's personality and their social environment. Adolescents with this propensity are theorised to become engaged in a lifestyle within which problem behaviours and related outcomes are common. Problem Behavior Theory has been supported in a number of studies, including one confirmatory factor analysis using data from adolescents, which indicated that alcohol use, drug use, risky driving and delinquency reflected one underlying component (Vingilis & Adlaf, 1990).

There have been a few studies that have since examined the link between participation in multiple problem behaviours and the outcome of injury experience although primarily research has examined single problem behaviours and their link with injury (see Mytton et al., 2009). For example, Jelalian and colleagues (1997), in a cross-sectional study of 1,426 adolescents aged 14-18 years in the United States, found that self-reported participation in risk-taking behaviours was significantly associated with a total score of injuries experienced in the prior six months. Their measure of risk-taking however combined specific risk behaviours such as "ridden in a car with a dangerous driver" as well as general risks including "doing something risky for fun" and "doing something dangerous".

Research by Pickett and colleagues (2002a) examined information about specific behaviours that may make young people more vulnerable to injury. Pickett et al. (2002a) used a single item measure from the Health Behavior of School-aged Children survey that asked adolescents to identify the number of injuries for which they had medical treatment over the previous 12 months. This study found a relationship between injury and engagement in health risk behaviours, which was consistent across various countries in Europe and North America (Pickett et al., 2002b). Supporting the notion that multiple problem behaviours predict injury

involvement, adolescents who reported the largest number of health risk behaviours were found to be 2.46 times more likely to report injuries (Pickett et al., 2002b). The health risk behaviours assessed included substance use, failure to use seatbelts, bullying, excess time with friends, truancy, and a poor diet.

A later study examined adolescents' early engagement in behaviours more closely related to Jessor and Jessor's Problem Behavior Theory, including alcohol, tobacco and cannabis use and sexual intercourse (de Looze et al., 2011). The results of this study showed that early engagement in these behaviours was predictive of injury at age 15 years (de Looze et al., 2011). This finding was shown to be consistent across 25 European and North American countries. While this large-scale study advanced previous research by examining links between the early onset of problem behaviours and later injury, a cross-sectional design was still employed, whereby adolescents were asked at what age they first engaged in particular behaviours (de Looze et al., 2011).

The current study extends previous work in the area by examining a collection of anti-social and delinquent behaviours that occur both among a large minority of adolescents (e.g. alcohol use) and those that are less common among adolescents but potentially with more severe consequences (e.g. unlicensed driving or riding in a car with a drunk or dangerous driver). These chosen behaviours reflect the theoretical framework of Problem Behavior Theory as discussed by Jessor and Jessor (1997). Extending on previous research, the current study also includes a longitudinal component in which injury is measured three months after problem behaviours.

This study also examines the association between anti-social and delinquent behaviours and both untreated and medically treated injuries. This is important as several factors, such as social class differences, have been identified as influencing decisions to present for medical treatment (Williams, Currie, Wright, Elton, Beattie, 1997). Data based on

medical records therefore tends to under-represent the true incidence of injury. Additionally, although severe injuries represent a primary public health concern, there is an emerging need for injury prevention approaches to address more common injuries that contribute fundamentally to the total injury burden (McClure, 1995).

2. Method

2.1 Participants & Procedure

Procedures followed those approved by university and education board ethics committees. Year 9 students at five high schools participated (aged 13-14 years). Written parental and student consent was obtained for 678 students (83%). Of these, 540 students (80%) were in class for survey administration (50% female). A subsample of 216 (from two schools) completed a follow-up survey three months later (56% female). Researchers administered the survey (approximately 40 minutes in duration).

2.2 Measures

The Extended-Adolescent Injury Checklist (Chapman, Buckley & Sheehan, 2011) is a self-report measure of the types of injuries (e.g. broken bone, sprain or strain) experienced over three months. Adolescents answer yes or no to whether they had each of a list of injuries. For each injury experienced, they then indicate whether it required medical treatment (visit to a doctor or hospital). A strength of the scale is that it measures minor injuries (e.g., those untreated/ treated at home) as well as injuries of greater severity that require formal medical treatment.

The measure of anti-social and delinquent behaviours (Australian Self-Report Delinquency Scale, Mak, 1993) included items whereby participants respond yes or no as to whether or not they had engaged in certain behaviours during the past three months. The scale included a list of items relating to violence (4 items; e.g. getting into fights, using a

weapon, deliberately hurting another), drug use (4 items; marijuana, ecstasy, inhaling or 'chroming', using prescribed medication inappropriately), passenger risks (2 items; riding with a driver who was drinking or driving dangerously), driving risks (2 items; car, motorcycle without a licence), alcohol use (1 item), truancy (1 item) and failure to wear a bicycle helmet (1 item). Of note, bicycle helmet use is mandated by law in Australia (see Part 15, Section 256 Bicycle helmets, National Road Transport Commission, 2009).

3. Results

The most prevalent anti-social and delinquent behaviours included alcohol use and bicycle use without a helmet. Table 1 shows the percentage of adolescents who had engaged in each behaviour and the correlations between anti-social and delinquent behaviour and injury experience.

INSERT TABLE 1

Logistic regression analyses assessed associations between engagement in delinquent behaviour and injury. Participant's sex was entered as the first step in each regression analyses however were non-significant.

Engagement in specific delinquent behaviours was associated with increased likelihood of injury (see table 2). The odds of reporting any injury (whether medically-treated or not) was associated with engagement in a number of anti-social and delinquent behaviours, including unlicensed driving (OR = 2.3), truancy (OR = 2.1), violence (OR = 1.6), alcohol use (OR = 2.0) and passenger risks (OR = 2.3). Failure to wear a bicycle helmet was not associated with greater likelihood of injury. Those who reported any of unlicensed driving, truancy, and perpetrating violence were more likely to report a medically-treated injury.

INSERT TABLE 2

Reports of greater involvement in delinquent behaviours as compared to little involvement (one or no behaviours reported), was associated with greater likelihood of injury. Those reporting four or five of the delinquent behaviours were 2.3 times more likely and those reporting six or seven delinquent behaviours were 7.8 times more likely to report two injuries or more. A second set of analyses was performed to examine the relationship between anti-social and delinquent behaviours and reported experience of injuries that were medically-treated. Again, reports of delinquent behaviour were associated with medically treated injuries. Those with greater involvement in delinquent behaviours were 5.0 times more likely to report a medically-treated injury than those who reported engaging in one or fewer delinquent behaviours.

To examine the likelihood of injury after a three month period, a logistic regression was conducted with baseline delinquency score entered at time one. Those reporting at least two injuries at Time 2 were 1.8 times more likely to have reported at least two anti-social or delinquent behaviours at Time 1.

4. Discussion

The results extend the findings of Pickett and colleagues (2002), in this case showing that clusters of anti-social and delinquent behaviours, as opposed to health risk behaviours, predict adolescents' later experience of injury. Adolescents reporting the greatest involvement in delinquent behaviours were around five times more likely to report a medically-treated injury and almost eight times more likely to report any injury. Further, this risk remained after three months, with adolescents almost twice as likely to report an injury if they were involved in anti-social or delinquent behaviour at the earlier time. In addition, adolescents were more likely to report a medically-treated injury if they were involved in truancy, violent behaviours, and drug use.

Although some anti-social and delinquent behaviours may in some cases be directly related to risk of injury (e.g. violence), it is also likely that a third variable, adolescents' propensity for problem behaviour, is involved in this link. This corresponds to Jessor and Jessor's (1997) Problem Behavior Theory. While, for example, truancy or inappropriate use of prescription medicine may not necessarily lead directly to experiences of injury, they are likely to form part of a constellation of anti-social and delinquent behaviours that signals an underlying propensity for problem behaviour. The lifestyle that this propensity initiates is highly likely to involve participation in a variety of injury-related behaviours.

An interesting finding of this research was that failure to wear a bicycle helmet was not associated with experience of any injury. It may be, however, that this behaviour reflects a different cluster of anti-social and delinquent behaviour that was not shown in this study to be predictive of injury. In a study examining the interrelation of health risk behaviours among Norweigen adolescents, Røysamb, Rise and Kraft (1997) found three general dimensions of behaviour including "high-action", "addiction" and "protection" behaviours. While, for example driving-related behaviours formed part of the "high action" dimension, and alcohol use formed part of the "addiction" dimension, behaviours such as use of safety equipment clustered under the "protection" dimension. Future research should further examine the link between protective behaviours such as helmet use and later injury among adolescents.

Findings showed a somewhat similar pattern of engagement in anti-social and delinquent behaviours and experiences of injury for both males and females, except with regard to engagement in violence, driving and truant behaviours. The first step in the regression analyses of sex, was non-significant in all of the models. Results suggest that engagement in the delinquent behaviours still predicts injury experience for both males and females, although there are less of some behaviours being performed by females, potentially reflecting some difference in risky lifestyle for males and females.

One of the limitations to the study however includes the reliance on self-report measures that raises some concern about possible inflated levels of associations. This study was however designed to detect injuries that may be less severe as well as those that were medically-treated including injuries that might lead to time off school and longer-term susceptibility to further injury.

Many of the target problem behaviours are most likely to be independent (e.g. it is unlikely that students undertake both violence and passenger risks at the same time). For alcohol use, drug use and truancy, however, it may be that there is some co-occurrence of problem behaviours at a specific point in time. As such, it is not known whether engaging in multiple problem behaviours on one occasion (such as violence and alcohol use) is of greater risk for injury than engaging in a single behaviour more frequently. Additionally, as the measure of delinquency used in the current study asks adolescents whether or not they had engaged in behaviours rather than the frequency of engagement, we are unable to determine the comparative injury risk of adolescents who engage regularly in one delinquent behaviour as opposed to a wide range of behaviours over time. Future research using measures that are able to capture frequency data may be able to further explore these issues.

5. Conclusions

The research sought to add to the findings surrounding Jessor and Jessor's Problem Behavior Theory and extend the work of Pickett et al. (2002a;b) by examining the relationship of a cluster of anti-social and delinquent behaviours and subsequent injury. The work advances research on PBT by showing there is a cumulative effect of involvement in anti-social and delinquent behaviours that predicts likelihood of injury experience. The research provides evidence for the PBT concept of a 'problem lifestyle' which was defined by engagement in a suite of alcohol, drug, violence (including threats of harm), road-related (across many vehicles) and truant behaviours. A stronger endorsement of such a lifestyle as

defined by engagement in a greater breadth of behaviours was shown to be highly predictive of an acute health outcome. This extends the work of Pickett et al. (2002a;b) who focused on health risk behaviours as predictors of injury cross-sectionally. Measurement of injury using self-reported experience taps into the broader potential array of consequences that can be missed by examining on ED experiences and further advances work in the area by using a multi-item construct that may aid young persons' recall (prompting with different injury types).

The results have implications for the development of injury prevention programs, particularly those delivered in the school setting. Schools have increasing demands on curriculum and prevention efforts which target change in a risky lifestyle collectively rather than single risk behaviour would have considerable appeal. Such programs would extend upon the typical approach of attempting to reduce a single risk-taking behaviour at a time. Research should thus also extend to understanding the etiology of a complex pattern of lifestyle risks.

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Table 1

Percentage of young people reporting risk-taking and correlations between risk-taking behaviour

	alcohol	helmet	truancy	violence	drugs	passenger	drive	Medic. injury	Any 2 injuries
Percent engaged in the behaviour									
Overall	37%	45%	19%	31%	15%	28%	23%		
Males	38%	56%	18%	37%	16%	30%	34%	15%	36%
Females [a]	36%	34%	19%	25%	12%	25%	15%	12%	28%
Correlations									
Alcohol	1.000								
Helmet [b]	.19**	1.00							
Truancy	.23**	.23**	1.000						
Violence [c]	.24**	.22**	.39**	1.00					
Drugs [d]	.23**	.12**	.32**	.34**	1.00				
Passenger [e]	.28**	.2**	.34**	.30**	.33**	1.00			
Drive [f]	.31**	.33**	.26**	.30**	.31**	.44**	1.00		
Medic. injury	.08	.06	.12*	.13**	.06	.08	.22**	1.00	
Any 2 injuries	.15**	.11*	.14**	.11*	.18**	.19**	.18**	.17**	1.00

* p <.01, ** p <.001.

[a] **Significant differences between male and females for experiences of helmet, violence and drive only with significance levels set at p<.05 for behaviours and injury [χ^2** = 26.3, 10.9, 32.1 (respectively), p<.01], [b] **Failure to wear a bicycle helmet,** [c] Includes taking part in a fight, deliberately hurting somebody, use a weapon, threaten someone; [d] Includes marijuana, ecstasy, speed, chroming and use medicine for fun; [e] Includes passenger of a dangerous driver and drink driver; [f] Includes drive a car, drive a motorbike on-road, drive when drinking, speed, joyride.

Table 2

Logistic regression analysis for association between risk behaviours and injury

	% Injured	% Not Injured	B	SE	Exp(B)	CI
Dependent Variable: Injury Types						
Physical violence [a]	39.7	60.3	.48	.23	1.61	1.03-2.52
Drug use[b]	53.6	46.4	1.00	.30	2.71*	1.52-4.83
Passenger [c]	46.4	53.6	.85	.23	2.33**	1.48-3.66
Driving [d]	46.7	53.3	.84	.25	2.31*	1.41-3.77
Helmet [e]	37.6	62.4	.42	.22	1.52	1.00-2.33
Truancy	46.1	53.9	.76	.26	2.14*	1.28-3.56
Alcohol use	41.6	58.4	.67	.22	1.96*	1.28-3.00
Number of high risk behaviours						
0-1 [f]	43.0	57.3				
2-3	20.7	27.6	.041	.27	.96	.57-1.63
4-5	23.7	12.9	.85	.29	2.34*	1.33-4.13
6-7	12.6	2.1	2.05	.50	7.80**	2.93-20.77
Dependent Variable: Medically treated injury						
Physical violence [a]	20.3	79.7	0.75	0.30	2.12*	1.19-3.77
Drug use [b]	18.3	81.7	.45	.37	1.57	.76-3.26
Passenger [c]	17.4	82.6	.48	.31	1.61	.89-2.94
Driving [d]	25.3	74.7	1.32	.32	3.75**	2.01-6.99
Failure to wear a helmet [e]	15.4	84.6	.27	.30	1.31	.74-2.34
Truancy	21.5	78.5	.76	.32	2.14*	1.14-4.04
Alcohol use	16.5	83.5	.43	.29	1.53	.87-2.71
Number of high risk behaviours						
0-1[f]	39.3	54.1				
2-3	21.4	25.1	.16	.38	1.18	.56-2.48
4-5	23.2	16.5	.62	.39	1.87	.88-3.97
6-7	16.1	4.3	1.61	.48	4.96**	1.95-12.62
Dependent Variable: Any Injury (3 months later)						
Number of high risk behaviours						
0-1[f]	59.9	40.1				
2 or more	60.8	39.2	.60	.30	1.81*	1.02-3.24

* p <.01, ** p <.001.

[a] Includes; taking part in a fight, deliberately hurting somebody, use a weapon, threaten someone; [b] Includes; marijuana, ecstasy, speed, inhaling or chroming and use medicine for fun; [c] Includes; passenger of a dangerous driver and drink driver; [d] Includes; drive a car, drive a motorbike on-road, drive when drinking, speed, joyride. **[e] Failure to wear a bicycle helmet. [f] reference category**